ORMS 3310 **Chapter 7 – Practice Problems**

NAME: _____

1. The assembly line that produces an electronic component of a missile system has historically resulted in a 3% defect rate. A random sample of 800 components is drawn. What is the probability that the defect rate is greater than 4%?

   ANSWER: There is a 4.75% probability that the missile component defect rate will be greater than 4% based on a sample of size 800.

2. The Not Red Lobster restaurant in Corpus Christi had 12,000 guests in 2003. A survey was given to each of these guests. Based on the results of the survey, the management found that 75% of its customers rate the service as below average. The national chain executives want to examine these results. They ask six randomly selected customers to rate the service. What is the probability that more than 76% rate the service as below average?

   ANSWER: There is a 47.61% probability that more than 76% of the restaurant's customers will rank their service as below average based on a sample of size 6.

3. The Travel Weekly International Air Transport Association survey asked business travelers about the purpose for their most recent trip. Nineteen percent responded that it was for an internal company visit. Suppose 950 business travelers are randomly selected. What is the probability that between 16% and 20% of the business travelers say that the reason for their most recent business trip was an internal company visit?

   ANSWER: There is a 77.61% probability that between 16% to 20% of the business travelers will say that the most recent reason for their trip was for an internal company visit based on a sample of size 950.

4. According to a study by Decision Analyst, 21% of the people who have credit cards are very close to the total limit on the card(s). Suppose a random sample of 600 credit card users is taken from a population of 11,700 credit card users. What is the probability that more than 24% of the credit card users are very close to the total limit on their cards?

   ANSWER: There is a 3.22% chance that more than 24% of the credit card users are very close to the limit on their credit cards based on a sample of size 600.

5. The amount of time spent by North American adults, a population of 2000, watching television per day is normally distributed with a mean of 6.8 hours and a standard deviation of 1.5 hours. What is the probability that the average time watching television by a random sample of 120 North American adults is more than 7 hours?

   ANSWER: There is a 6.55% chance that the average time a North American adult spends watching television is more than 7 hours for samples of size 120.

6. The average annual salary for federal government employees in Indiana during 1999 was $41,979 (The World Almanac 2001). Use this figure as the population mean and assume the population standard deviation is $5000. Suppose that a random sample of 50 federal government employees will be selected from the population. What is the probability that the sample mean will be more than $42,500?

ANSWER: There is a 22.96% chance that the average federal government employees in Indiana will have an average salary of more than $42,500 for samples of size 50.

7. According to an IRS study, it takes an average of 330 minutes for taxpayers to prepare, copy, and electronically file a 1040 tax form. A consumer watchdog agency selects a random sample of 40 taxpayers and finds the standard deviation of the time to prepare, copy, and electronically file form 1040 is 80 minutes. Assume the time required to prepare, copy, and electronically file form 1040 is normally distributed. What is the probability that the sample mean is within 10 minutes of the population mean?
ANSWER: There is a 57.04% chance that the average time needed to prepare and file a 1040 tax form will be between 320 and 340 minutes for samples of size 40.

8. Legislators are allowed certain postal privileges to communicate with their constituencies. Suppose that for the 435 members of Congress, the mean annual postage use is $1630 with a standard deviation of $170. If a sample of 40 members of Congress is obtained, what is the probability that the average annual postage charge for this group of 40 is between $1600 and $1660?
ANSWER: There is a 75.80% chance that the average annual postage use by members of Congress will be between $1600 and $1660 for samples of size 40.

9. In a survey of members of the American Society for Quality (ASQ), a response from 1 to 5 (with 5 representing strongly disagree and 1 representing strongly agree) was given to the statement: "I think that it is possible to teach industry-relevant skills for the quality assurance function in an academic course." The mean response was 1.62 with a standard deviation of .84. Assume that this mean and standard deviation are representative of the population mean and standard deviation for the entire 7,500 members of the ASQ. Find the probability that in a sample of 50 ASQ members the sample mean response to the above statement is within ± 0.12
ANSWER: There is a 68.76% chance that the mean response for the ASQ members will be between 1.50 and 1.74 for samples of size 50.

10. Suppose a subdivision on the south side of Corpus Christi contains 1500 houses. The subdivision was built in 1993. A sample of 100 houses is selected randomly and evaluated by an appraiser. The mean appraised value of a house in this subdivision is $210,000, with a standard deviation of $12,500. What is the probability that the sample average is greater than $213,000?
ANSWER: There is a 0.66% chance that the mean house value will be greater than $213,000 for samples of size 100.

11. The average length of actual running time (excluding advertisement) for TV feature films is 1 hour and 40 minutes, with a standard deviation of 15 minutes. If a sample of 49 TV feature files is taken at random, what is the probability that the average running time for this sample is 1 hour and 45 minutes or more?
ANSWER: There is a 0.99% chance that the mean feature running time is 1 hour and 45 minutes or more for samples of size 49.

12. The mean tuition cost at state universities throughout the United States is $4260 per year. Use this value as the population mean and assume that the population standard deviation is $900. Suppose a random sample of 50 state universities will be selected. What is the probability that the simple random sample will provide a sample mean within $100 of the population mean?
ANSWER: There is a 57.04% chance that the mean tuition will be within $100 of the population mean for samples of size 50.